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# **Evaluation of New Canal Point Sugarcane Clones**

## **1997–98 Harvest Season**

## ABSTRACT

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Twenty-eight replicated experiments were conducted on nine farms (representing four organic soils and two sand soils) to evaluate 46 new Canal Point (CP) clones of sugarcane from the CP 93, CP 92, CP 91, and CP 90 series. Experiments compared the cane and sugar yields of the new clones, complex hybrids of *Saccharum* spp., with yields of CP 70–1133, a minor cultivar on organic soils and the second most widely grown cultivar on sand soils in Florida. Yields are reported as metric tons of cane per hectare, metric tons of sugar per hectare, and kilograms of sugar per metric ton of cane. Each clone was rated for its susceptibility to diseases, and the CP 92 and CP 93 series clones were rated for their susceptibility to cold temperatures.

The audience for this publication includes geneticists, researchers, growers, extension agents, and individuals in industry who are interested in sugarcane clone development.

**Keywords:** Histosol, muck soil, organic soil, *Puccinia melanocephala*, *Saccharum* spp., stability-safety index, sugarcane cultivars, sugarcane rust, sugarcane smut, sugarcane yields, sugar yields, *Ustilago scitaminea*.

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# EVALUATION OF NEW CANAL POINT SUGARCANE CLONES

1997-98 HARVEST SEASON

B. GLAZ, J.C. COMSTOCK, P.Y.P. TAI,  
J.D. MILLER, AND L.Z. LIANG

Clonal selection at precommercial stages supports the commercial production of sugarcane, complex hybrids of *Saccharum* spp. Although production of sugar per unit area is a very important characteristic, it is not the only factor on which sugarcane is evaluated. In addition, the concentration of sugar and the fiber content of the cane are analyzed. The time of year and the duration that a clone yields its highest amount of sugar per unit area can be very important, since sugarcane harvest seasons extend from fall to spring. Because sugarcane is commercially grown in plant and ratoon crops, clones are evaluated accordingly. Adaptability to mechanical harvesting and seed cane cutting are important traits in Florida.

Information about the stability of a clone's performance across environments aids in selecting clones that will yield well across all environments. Stability measurements also enable identification of clones that will perform well in some but not all environments. This stability factor is important in our evaluations because of the wide range of environments for growing sugarcane in Florida. As differences widen for such characteristics as temperature, moisture, and soil, region-specific clones become necessary because few clones produce high yields in markedly different environments.

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Clones with desired agronomic characteristics also must be productive in the presence of harmful diseases, insects, and weeds. Some pests rapidly develop new, virulent races or strains. Clonal resistance to such pathogens often changes over time, so no clone can be considered permanently resistant. The selection team must try not to discard clones that have sufficient resistance or tolerance to pests, but it also must discard clones that are too susceptible to pests to be grown commercially. Sugarcane growers in Florida rely much more on tolerance than resistance to sugarcane diseases. In the 1997 growing season, the top seven cultivars made up 75.5 percent of the total Florida sugarcane hectareage (Glaz 1997). Each of these seven cultivars, CP 80-1827, CP 72-2086, CP 80-1743, CL 61-620, CP 73-1547, CP 70-1133, and CP 78-1628, was susceptible to sugarcane rust, mosaic, leaf scald, or smut. Glaz et al. (1986) presented a formula and procedure to help growers distribute their available sugarcane cultivars while considering possible attacks of new pests.

The disease that has caused the most difficulty in Florida in selecting resistant sugarcane cultivars is sugarcane rust, caused by *Puccinia melanocephala* Syd & P. Syd. The disease against which Florida sugarcane growers and scientists have had the most success in selecting resistant cultivars is sugarcane smut, caused by *Ustilago scitaminea* Syd and P. Syd. Other diseases with which Florida sugarcane growers must contend are leaf scald, caused by *Xanthomonas albilineans* (Ashby) Dow; yellow leaf syndrome, caused by a luteovirus (Lockhart et al. 1996); and sugarcane mosaic virus. Ratoon stunt disease (RSD), caused by *Clavibacter xyli* subsp. *xyli*, has probably been the most damaging, although the least visible, sugarcane disease in Florida. Some growers minimize losses from RSD by using hot-water treatments to obtain disease-free seed cane. Scientists at Canal Point screen clones for resistance to rust, smut, leaf scald, mosaic, RSD, and eye spot,

which is caused by *Bipolaris sacchari* (E.J. Butler) Shoemaker. Eye spot is not currently a commercial problem in Florida.

Damaging insects in Florida of long duration are the sugarcane borer, *Diatraea saccharalis* (F.); the sugarcane wireworm, *Melanotus communis*; and the sugarcane grub, *Ligyris subtropicus*. An insect discovered in Florida in 1990, the sugarcane lace bug, *Leptodictya tabida* (Hall 1991), has also become a pest, selectively feeding on some clones. In 1994, another insect pest new to commercial sugarcane fields in Florida was found—the West Indian cane weevil, *Metamasius hemipterus* (L.) (Sosa 1995). In 1994, this weevil caused particularly severe damage to several plantings of CP 85-1382, a promising new clone described previously in this series of reports.

Geneticists at Canal Point are working to incorporate borer resistance into the breeding program by selecting for leaf pubescence (a trait known to promote resistance) in elite sugarcane clones (Sosa 1996). Currently, there are no known commercial sugarcane cultivars with pubescent leaves.

Winter freezes are common in the region of Florida where much of the sugarcane is produced. The severity and duration of a freeze and the specific sugarcane cultivar are the major factors that determine how much damage occurs. The damage caused by such freezes ranges from none to death of the mature sugarcane plant. The sugar content of these plants declines rapidly if temperatures return to normal, warmer ranges soon after the freeze. Young, recently planted and emerged sugarcane plants may die from severe freezes. Beginning this year, this report includes reactions of sugar content of mature sugarcane clones after a freeze.

A new emphasis for the Canal Point genetics program is to breed and select sugarcane cultivars that enhance sugarcane's relationship with the surrounding Everglades. Two strategies that are part of the Canal Point program

are to breed and select clones that help reduce the phosphorus content of water discharged from Florida sugarcane farms and that yield well in soils with higher water tables.

Each year at Canal Point, about 100,000 seedlings are evaluated from crosses derived from a diverse germplasm collection. [However, reports from Mangelsdorf (1983) and Deren (1995) contend that the genetic base of U.S. sugarcane breeding programs is too narrow.] This year, most of the parental clones in the Canal Point program originated at Canal Point. Some of the clones used as parents this season also came from Clewiston (Florida), Louisiana, and Texas. In addition, several feral *Saccharum officinarum* and *S. robustum* clones and interspecific hybrids of these clones were used as parents.

About 10 percent of 100,000 seedlings from the seedling stage are advanced to stage I, whence about 10 percent of the 10,000 clones are advanced to stage II. The 1,000 clones in stage II were visually selected in the seedling and stage I phases. Once selected as seedlings, clones are vegetatively or clonally propagated. From this stage on in the selection program, all reproduction is vegetative; hence, the clones used are genetically identical, assuming no mutations or the unlikely formation and germination of true seeds in the plots. From these 1,000 selected clones in stage II, about 130 are selected for continued testing in replicated experiments. Each of the first three stages is evaluated for 1 year in the plant-cane crop. The primary selection criteria for the stage II and all subsequent stages are sugar yield, cane tonnage, and disease resistance.

The stage III clones are evaluated for 2 years, in the plant-cane and first-ratoon crops, at four locations. The 11 most promising clones receive continued testing for 4 more years in the stage IV experiments reported in this annual publication. Tai and Miller (1989) also described this selection program from the

seedling to the stage IV phase. Clones that successfully complete these experimental phases undergo 2 to 4 years of evaluation and seed-cane increase by the Florida Sugar Cane League before commercial release. Some of this evaluation occurs concurrently with the evaluations described here.

Clones with characteristics that may be valuable for sugarcane breeding programs are identified throughout the selection process. Sugarcane geneticists in other programs often request clones from Canal Point. From May 1997 to April 1998, Canal Point answered requests for clones or seeds from El Salvador, Guatemala, Mexico, Morocco, Nicaragua, Pakistan, Switzerland, and Thailand. Louisiana, Maryland, South Carolina, Texas, and Virginia and six other locations in Florida also received Canal Point clones.

The purpose of this report is to summarize the performance of the clones in the plant-cane, first-ratoon, and second-ratoon stage IV experiments sampled in Florida's 1997–98 sugarcane harvest season.

## TEST PROCEDURES

In 28 experiments, 46 new CP clones (11 clones of the CP 93 series in the plant crop, 11 clones of the CP 92 series in the plant-cane and first-ratoon crops, 12 clones of the CP 91 series in the first- and second-ratoon crops, and 12 clones of the CP 90 series in the second-ratoon crop) were evaluated at 9 farms. CP 91–2246 and CP 91–1560 were included in 9 of the 10 experiments with CP 91 series clones, and CP 91–1609 was tested at one location with CP 91 series clones. In the second-ratoon experiments of the CP 90 series clones, CP 90–1428 was planted at the two farms with organic soils and CP 90–1030 at the farm with a sand soil.

CP 70–1133 was the reference clone in all 28 experiments. It was the second most widely grown cultivar on sand soils but only a minor cultivar on organic soils in Florida. Overall,

CP 70–1133 was the sixth most widely grown sugarcane cultivar in Florida (Glaz 1997).

The second-ratoon experiment at A. Duda and Sons (Duda) southeast of Belle Glade, the CP 92 series first-ratoon and the two second-ratoon experiments at Okeelanta Corporation (Okeelanta) south of South Bay, and the first-ratoon experiment at Knight Management (Knight) southwest of 20-Mile Bend were conducted on Dania muck soils. As described by McCollum et al. (1976), Dania is the shallowest of the organic soils in the Everglades agricultural area that is composed primarily of decomposed sawgrass (*Cladium jamaicense* Crantz). The other organic soils similar to Dania muck, listed in order of increasing depth, are Lauderhill, Pahokee, and Terra Ceia mucks.

Ten experiments were conducted on Lauderhill mucks—all three experiments planted at Sugar Farms Co-op Western Division (SFCW) east of Canal Point, all three experiments planted at Wedgworth Farms (Wedgworth) east of Belle Glade, the plant-cane and second-ratoon experiments at Knight, the first-ratoon experiment at Duda, and the CP 93 series plant-cane experiment at Okeelanta.

The two ratoon experiments at Sugar Farms Co-op Eastern Division (SFCE) near 20-Mile Bend in Palm Beach County, the plant-cane experiment at Duda, the CP 92 series plant-cane experiment at Okeelanta, and the CP 91 series first-ratoon experiment at Okeelanta were conducted on Pahokee muck soils.

The three experiments at Eastgate Farms (Eastgate) north of Belle Glade were on Torrey muck. The three experiments at Hilliard Brothers' of Florida (Hilliard) west of Clewiston were on Malabar sand. The two experiments at Lykes Brothers' Farm (Lykes) near Moore Haven in Glades County were on Pompano fine sand.

The two experiments at Lykes and the CP 92 series plant-cane, the CP 91 series first-ra-

toon, and the CP 90 series second-ratoon experiments at Okeelanta were planted on fields in successive sugarcane rotations. The other experiments were planted in fields that had not been cropped to sugarcane for approximately 1 year. In all experiments, clones were planted with two lines of seed cane per furrow in plots arranged in randomized complete-block designs with eight replications. Each two-row plot was 10.7 m long and 3 m wide (0.0032 ha). The distance between rows was 1.5 m, and 1.5-m alleys separated the front and back ends of the plots. The margins of the experiments were protected with an extra row of sugarcane on each side (usually the same clone as planted in the adjacent plot) and an extra 1.5 m of sugarcane in the front and back.

Samples of 10 stalks per plot were cut from unburned cane from all plots in each experiment between October 6, 1997, and February 25, 1998. In all experiments, one sample was cut from the middle row of each plot. In addition, a preharvest sample was cut from two replications of seven plant-cane experiments between October 10, 1997, and October 30, 1997. For all samples, once a stool of sugarcane was chosen for cutting, the next 10 mature stalks in the row were cut as the 10-stalk sample. The range of sampling dates for each crop was as follows: October 28, 1997, to February 25, 1998, for the plant crop; November 25, 1997, to February 25, 1998, for the first-ratoon crop; and October 6, 1997, to December 19, 1997, for the second-ratoon crop. After the stalk samples were transported to the Agricultural Research Service's Sugarcane Field Station at Canal Point for weighing and milling, crusher juice samples from the stalks were analyzed for Brix and sucrose, and theoretical recoverable yields of kg 96° sugar per metric ton of cane (KS/T) were determined as a measure of sugar production. The procedure used to calculate these yields using fiber percentages is described by Legendre (1992).

Total millable stalks per plot were counted between June 25 and September 15, 1997. Yields of metric tons of cane per hectare (TC/H) were calculated by multiplying stalk weights by number of stalks. Theoretical yields of metric tons of sugar per hectare (TS/H) were calculated by multiplying TC/H by KS/T and dividing by 1,000.

Analyses of variance were done using the procedures described by McIntosh (1983). *F*-ratios were chosen according to a mixed model, with treatments (clones) fixed and locations random. The source of variation that corresponded to the error term for the effect being tested was used to calculate the least significant difference (*LSD*). *LSD* was used regardless of significance of *F*-ratios in all analyses to protect against high type-II error rates, and significant differences were sought at the 10-percent probability level (Glaz and Dean 1988).

Analyses of clonal stability across locations were done by using the procedures recommended in Shukla (1972). For each clone, the stability-variance parameter of Shukla was subsequently used to calculate (at the 1-percent probability level) a stability-safety index as described by Eskridge (1990). The mean yield of the clone and the stability of the clone across locations influence the value of this stability-safety index. The higher the stability-safety index, the more likely the clone is to have high yields at all locations.

Before the clones were evaluated in stage IV, they were tested in separate tests by artificial inoculation for susceptibility to sugarcane smut, sugarcane mosaic virus, leaf scald, and RSD. Clones were inoculated in stage II plots to determine eye spot susceptibility. Since being advanced to stage IV, separate artificial-inoculation tests were repeated with pathogens of smut, RSD, mosaic, and leaf scald. Each clone was also rated for its reactions to natural infection by sugarcane smut, sugarcane rust, sugarcane mosaic

virus, and leaf scald. The farm management at each location controlled sugarcane management practices, such as fertilization, cultivation, and pest control.

Two separate tests were conducted at Gainesville, Florida, to determine cold tolerance of clones from the CP 92 and CP 93 series. These tests were conducted at the Florida Institute of Food and Agricultural Sciences' Greenacre Agronomy Farm. The experiments were planted in randomized complete blocks with six replications. Plots were 1.5 m long and 2.1 m wide. A moderate freeze of  $-2^{\circ}\text{C}$  occurred on December 6, 1997, followed by a second freeze of  $-4^{\circ}\text{C}$  on December 7. Stalks were sampled for the analysis of sucrose content on December 18, 1997, and February 2, 1998. The cold-tolerance rating was based on the deterioration of juice quality after the freeze damage to mature sugarcane stalks.

## RESULTS AND DISCUSSION

Table 1 lists the parentage, percentage of fiber, and reactions to smut, rust, leaf scald, and mosaic diseases for each clone included in these experiments and cold tolerance for the clones in the CP 92 and CP 93 series. Tables 2–5 contain the results of the CP 93 series plant-cane experiments, and tables 6 and 7 contain the results of the CP 92 series plant-cane experiments. Tables 8–10 contain the results of the CP 92 series first-ratoon experiments, and tables 11 and 12 contain the results of the CP 91 series first-ratoon experiments. Tables 13–15 contain the results of the CP 91 series second-ratoon experiments, and tables 16 and 17 contain the results of the CP 90 series second-ratoon experiments. Table 18 lists the dates that stalks were counted in each experiment.

This year for the first time since this annual report has been published, no experiments were conducted on a Terra Ceia muck. Terra Ceia muck is the deepest of the four organic soil types composed mostly of decomposed

sawgrass. Its nonpresence is a sign of the soil subsidence that occurs when organic soils are drained.

For the 5,000 years before humans began draining it, the Everglades agricultural area was flooded for 9 to 11 months during years of normal rainfall. Under these conditions, the organic soils accreted at the mean rate of 0.08 cm per year (McDowell et al. 1969). Since drainage, soils in this region subsided at the rate of about 2.5 cm per year until 1978 (Shih et al. 1978). From 1978 to 1997, the rate of subsidence decreased to 1.4 cm per year due to growers' efforts to maintain higher water tables (Shih et al. 1997). Although there are other factors, the major cause of this soil subsidence is the oxidation of organic matter; many of these soils contain more than 85 percent organic matter.

### Plant-Cane Crop, CP 93 Series

CP 70–1133 and four new clones—CP 93–1596, CP 93–1309, CP 93–1634, and CP 93–1382—make up the group with the highest TS/H yields (table 5). The TS/H yields of CP 93–1596, CP 93–1309, and CP 93–1634 were more stable than those of CP 70–1133 and CP 93–1382. CP 93–1596 TC/H yields were significantly higher than those of any other clone except CP 93–1634 and CP 70–1133. Otherwise, CP 70–1133, CP 93–1309, CP 93–1634, and CP 93–1382 all had similar TC/H yields (table 2). The commercial desirability of CP 93–1596 was reduced by its low preharvest and harvest KS/T yields, both significantly less than those of CP 70–1133 (tables 3 and 4). Also detracting from CP 93–1596's commercial desirability were its undetermined susceptibility ratings for leaf scald and mosaic (table 1). CP 93–1596 developed leaf scald and mosaic in inoculated tests, but it is not yet known if it can be grown safely for commercial production.

CP 93–1309 had outstanding preharvest and harvest KS/T yields (tables 3 and 4). Its preharvest KS/T yield was significantly

greater than that of eight other new clones, and its harvest KS/T yield was significantly greater and much more stable than that of any other clone. CP 93-1309 also had a good rating for cold tolerance and was found resistant to all major diseases except rust and mosaic. Increases of seed cane of CP 93-1309 were begun for potential release (table 1)

The TC/H yield of CP 93-1634 was significantly greater than those of five other CP 93 clones but similar to that of CP 70-1133 (table 2). The preharvest and harvest KS/T yields of CP 93-1634 were also similar to those of CP 70-1133 (tables 3 and 4). CP 93-1382 and CP 93-1634 had similar TC/H yields, but the TC/H yield of CP 93-1382 was significantly greater than the TC/H yields of only three rather than five other new CP 93 clones (table 2). CP 93-1382 had a very low mean preharvest KS/T yield, significantly lower than that of CP 70-1133 (table 3). Conversely, CP 93-1382 had moderately high KS/T yields at normal harvest dates (table 4). The preharvest and harvest KS/T yields of CP 93-1382 across locations were unstable (table 4). Both CP 93-1634 and CP 93-1382 had good cold tolerance, and between the two clones the only disease concern was the undetermined leaf scald rating of CP 93-1634. Seed-cane supplies of CP 93-1634 and CP 93-1382 are being increased for potential commercial release (table 1). CP 93-1596, CP 93-1309, and CP 93-1634 had low fiber percentages, each between 9 and 10 percent, and CP 93-1382 had a moderately low fiber percentage.

### **Plant-Cane Crop, CP 92 Series**

Last year's report contained the results from six locations of the CP 92 series from the plant-cane crop (Glaz et al. 1998). This year, results are available from three additional locations (tables 6 and 7). When averaged across the three locations, CP 92-1666, CP 92-1167, CP 92-1435, CP 92-1641, and CP 70-1133 were in the highest group of clones

for TS/H yields (table 7). The same four new clones had high yields in the plant-cane tests last year. All except CP 92-1435 had similar yield characteristics this year and last year. CP 92-1666 and CP 92-1167 had high TC/H yields (table 7) and KS/T yields similar to the KS/T yield of CP 70-1133 (table 6). Conversely, CP 92-1641 had moderate TC/H yields (table 7) and very high KS/T yields, significantly higher than that of any other clone (table 6). CP 92-1435 had significantly greater TS/H, TC/H, and KS/T yields than CP 70-1133 last year as plant cane. This year the same three yield characteristics for CP 92-1435 and CP 70-1133 were similar in the plant-cane crop (tables 6 and 7).

### **First-Ratoon Crop, CP 92 Series**

When yields for the CP 92 clones were averaged across all seven first-ratoon locations, no new clone yielded significantly greater TS/H than CP 70-1133 (table 10). However, CP 92-1666, CP 92-1167, and CP 92-1435, along with CP 70-1133, made up the top group of clones for TS/H. These three new clones also had significantly greater yields of TC/H than CP 70-1133 this year in the first-ratoon crop (table 8) and last year in the plant-cane crop (Glaz et al. 1998). CP 92-1641 yielded significantly more KS/T than CP 70-1133 (table 9). Last year CP 92-1641 had similarly high yields of KS/T, but its TC/H yield was not significantly less than that of CP 70-1133 as it was this year in the first-ratoon crop (table 8 and Glaz et al. 1998). CP 92-1666 had far more stable TC/H and TS/H yields than any of the other clones in this test (tables 8 and 10).

Table 1 contains cold tolerance ratings, disease ratings, and fiber percentages for these clones. CP 92-1666, CP 92-1167, CP 92-1435, and CP 92-1641 all had only fair or poor cold tolerance. CP 92-1666, CP 92-1167, and CP 92-1641 had fiber percentages in the normal commercial range for Florida, but the fiber of CP 92-1435 was above normal for

sugarcane grown in Florida. The major disease concern for CP 92-1435 and CP 92-1641 was mosaic, for CP 92-1666 it was smut, and for CP 92-1167, smut and rust. Seed-cane supplies of CP 92-1435, CP 92-1641, CP 92-1666, and CP 92-1213 are being increased for potential release. CP 92-1213 had moderate yields this year, is susceptible to smut, and has an undetermined leaf-scald rating. The Florida Sugar Cane League began increasing seed-cane supplies of CP 92-1167 and CP 92-1684 last year, but the Florida Sugarcane Variety Committee later decided to discontinue increasing these two varieties.

### **First-Ratoon Crop, CP 91 Series**

Last year's report contained the results from seven locations of the CP 91 series from the first-ratoon crop (Glaz et al. 1998). This year, results are available in the first-ratoon crop from three additional locations for these clones (tables 11 and 12).

All eleven CP 91 clones yielded less TS/H than CP 70-1133; TS/H yields for five of these clones were significantly less than that of CP 70-1133. Three clones of note in these tests were CP 91-1924, CP 91-1883, and CP 91-1238. CP 91-1924 yielded significantly more TS/H than any other clone in the successively planted experiment at Okeelanta (table 12), where it yielded moderately high KS/T and TC/H (tables 11 and 12). CP 91-1924 has had a history of unstable yields, particularly at Okeelanta. Two years ago in the plant-cane crop at Okeelanta it had high yields (Glaz et al. 1997), and last year it had low yields at Okeelanta in the first-ratoon crop and moderately high yields in the plant-cane crop of the successively planted experiment (Glaz et al. 1998). CP 91-1924 had a normal fiber percentage but an undetermined susceptibility to leaf scald (table 1).

CP 91-1883 yielded significantly more TS/H than any other clone on the Torry muck soil at Eastgate except CP 91-1238 (table 12). CP

91-1883 also had high KS/T and TC/H yields at Eastgate (tables 11 and 12). CP 91-1883 was well adapted to the Torry muck soil since its KS/T yields were relatively low on the sand soil at Hilliard and on the Pahokee muck soil at Okeelanta, the two other soils on which these clones were tested. CP 91-1238 had TC/H and TS/H yields similar to those of CP 91-1883 at Eastgate, but its KS/T yield was significantly lower than that of CP 91-1883. CP 91-1883 and CP 91-1238 had high yields at Eastgate last year in the plant-cane crop, but relative to the other clones, not as high as this year in the first-ratoon crop. CP 91-1238 had a low fiber percentage and CP 91-1883 a normal one (table 1). CP 91-1238 was susceptible to rust, and CP 91-1883 had no major disease susceptibility.

CP 91-1062 and CP 91-1150 are being increased for potential release (table 1) on sand soils. Both clones' KS/T yield was similar to CP 70-1133's, but the TC/H and TS/H yields of these two new clones were significantly less than those of CP 70-1133 on the sand soil at Hilliard (tables 11 and 12).

### **Second-Ratoon Crop, CP 91 Series**

When averaged across all seven locations, CP 91-1914, CP 91-1560, and CP 91-1924, along with CP 70-1133, had similarly high yields of TS/H (table 15). Along with CP 91-1865, these three CP 91 clones and CP 70-1133 also had similarly high TC/H yields (table 13). CP 91-1914 had significantly greater KS/T yields than all other clones; and CP 91-1924, CP 91-1560, and CP 70-1133 had similar KS/T yields (table 14).

When considering the three-crop cycle of plant-cane, first ratoon, and second ratoon, CP 91-1914 is the clone in this group that had the most consistently high KS/T, TC/H, and TS/H yields (Glaz et al. 1997, 1998 and tables 13-15). However, this year the second-ratoon TC/H and TS/H yields of CP 91-1914 were not stable, partially because of low

yields on the sand soil at Lykes (tables 13 and 15). CP 91–1914 did not have low TS/H yields relative to CP 70–1133 at Lykes in the plant-cane and first-ratoon crops (Glaz et al. 1997, 1998).

As mentioned in the previous section, CP 91–1062 and CP 91–1150 are being increased for potential release (table 1) on sand soils. Both new clones had TC/H, KS/T, and TS/H yields similar to those of CP 70–1133 this year in the second-ratoon crop on the sand soil at Lykes (tables 13–15). CP 91–1062 and CP 91–1150 had acceptable fiber levels for commercial production in Florida (table 1). CP 91–1062 had no major disease problems, but CP 91–1150 had undetermined susceptibility to smut, leaf scald, and mosaic.

CP 91–1883, which had high yields at Eastgate in the first-ratoon crop, had very low TC/H, KS/T, and TS/H yields when averaged across the seven locations in the second-ratoon crop (tables 13–15). These three characteristics for CP 91–1883 also had high stability-safety indices relative to its mean yields, indicating that it had consistently low yields for all three characteristics across the seven locations.

### **Second-Ratoon Crop, CP 90 Series**

No clone in this group yielded significantly more TS/H than CP 70–1133 (table 17). However, CP 90–1549, CP 90–1222, and CP 90–1464 had nearly equal TS/H yields, each almost significantly higher than the TS/H yield of CP 70–1133. CP 90–1549 and CP 90–1222 had significantly greater TC/H yields than CP 70–1133 but mediocre yields of KS/T (tables 16 and 17). CP 90–1549 had similar although not relatively as high TC/H and TS/H yields last year at seven locations in the second-ratoon crop, as well as in the first-ratoon crop at the same three locations as this year (Glaz et al. 1998). The relative yields of CP 90–1222 this year in the second-ratoon crop were similar to its yields in all test re-

sults reported since the plant-cane crop (Glaz et al. 1995, 1997, 1998). Both CP 90–1549 and CP 90–1222 have never been considered as potential commercial cultivars because of their low KS/T yields, both on sand and organic soils. In addition, CP 90–1222 had undetermined susceptibility to rust and leaf scald (table 1).

CP 90–1464 yielded well on the Torry muck soil at Eastgate. Its TS/H yield at Eastgate was significantly greater than the TS/H yields of all other clones except CP 90–1549 and CP 90–1222 (table 17). In addition, its TC/H and KS/T yields were both significantly greater than those of CP 70–1133 at Eastgate (tables 16 and 17). CP 90–1464 had similarly high yields on the Torry muck at Eastgate last year in the first-ratoon crop, but two years ago in the plant-cane crop its TS/H yield was similar to that of CP 70–1133 (Glaz et al. 1997 and 1998). CP 90–1464 has shown some susceptibility to rust and leaf scald (table 1).

### **SUMMARY**

The four most promising clones in the CP 93 plant-cane experiments were CP 93–1596, CP 93–1309, CP 93–1634, and CP 93–1382. CP 93–1596 and CP 93–1634 had high TC/H yields and moderately low KS/T yields. CP 93–1309 had moderate TC/H yields with very high KS/T yields. CP 93–1382 had moderately high TC/H yields, low preharvest KS/T yields, and high but unstable harvest KS/T yields.

This year, the CP 92 series was tested at three locations in the plant-cane crop and at seven locations in the first-ratoon crop. CP 92–1666, CP 92–1167, and CP 92–1435 had high overall TS/H yields when combining this year's plant-cane and first-ratoon results with last year's plant-cane results from seven locations. CP 92–1641 had a high mean TS/H yield across the three plant-cane tests this year and across the seven plant-cane tests

last year. CP 92-1641 had moderately high TS/H yields this year in the first-ratoon tests; its main attribute was high mean KS/T yields in all tests.

This year, the CP 91 series was tested at three locations in the first-ratoon crop and at seven locations in the second-ratoon crop. CP 91-1914 had the highest mean TS/H yield overall, but its TS/H yields in the second-ratoon experiments, relative to the other clones, were higher than those in the first-ratoon experiments. CP 91-1924 had high yields on successively planted land in the first-ratoon crop; and CP 91-1883 and CP 91-1238 had high first-ratoon yields on the Torrey muck soil.

Four years of testing the CP 90 series was completed this year with three second-ratoon experiments. As identified previously for this group of clones, CP 90-1549, CP 90-1222, and CP 90-1464 had high TS/H and TC/H yields. A major drawback for CP 90-1549 and CP 90-1222 has been their moderately low KS/T yields. Uncertain disease susceptibility has been the primary negative characteristic of CP 90-1464.

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**Table 1. Parentage, fiber content, and ratings of susceptibility to smut, rust, leaf scald, and mosaic for CP 70–1133 and 46 new sugarcane clones and ratings for freeze tolerance for CP 70–1133 and 22 new sugarcane clones**

Clone	Parentage	Percent fiber	Cold Tolerancet†	Rating*			
				Smut	Rust	Leaf scald	Mosaic
CP 70–1133‡	67 P 6 CP 56–63§	10.37	P	R	U	L	R
CP 90–1030	CP 76–331 × CP 81–1425	10.40		R	R	L	R
CP 90–1113	87 P 4 CP 80–1827§	9.85		R	U	S	U
CP 90–1151	87 P 4 CP 78–1247§	10.45		R	U	L	U
CP 90–1204	CP 82–2043 × CP 70–1133	10.90		R	U	U	R
CP 90–1222	87 P 9 CP 78–1247§	11.09		R	U	U	R
CP 90–1424	CP 78–1610 × CP 80–1827	10.96		R	U	L	R
CP 90–1428	CP 78–1610 × CP 80–1827	10.32		R	L	U	R
CP 90–1436	CP 81–332 × CP 78–1610	10.71		R	S	U	S
CP 90–1464	CP 81–1435 × CP 72–2086	10.57		U	L	U	L
CP 90–1510	CP 83–1770 × CP 83–1281	11.08		L	L	U	R
CP 90–1535	88 P 7 CP 81–1425§	9.91		R	R	L	U
CP 90–1549	CP 82–1592 × CP 84–1322	11.91		R	R	R	R
CP 91–1062††	88 P 9 CP 83–1281§	9.66		L	L	L	R
CP 91–1150††	88 P 7 CP 80–1827§	10.18		U	L	U	U
CP 91–1238	88 P 7 CP 70–1133§	8.79		R	S	R	R
CP 91–1560	CP 86–1791 × CP 82–2043	9.98		L	L	R	U
CP 91–1609	CP 83–1770 × CP 82–1505	9.83		R	R	R	R
CP 91–1865	88 P 17 CP 81–1425§	10.50		L	S	U	R
CP 91–1880	CP 82–2043 × CP 84–1322	10.57		U	L	L	R
CP 91–1883	CP 80–1827 × CP 84–1322	9.99		R	L	L	L
CP 91–1914	88 P 17 CP 80–1827§	9.88		U	U	L	R
CP 91–1924	CP 86–1791 × CP 81–2149	9.66		R	L	U	R
CP 91–1980	CP 62–374 × CP 84–1322	9.96		R	L	L	U
CP 91–2246	CP 77–1776 × CP 56–59	10.83		R	U	S	R
CP 92–1167	CP 84–1591 × SP 70–1143	10.49	F	U	U	S	L
CP 92–1213††	CL 73–239 × CP 85–1498	9.72	P	S	L	U	R
CP 92–1320	89 P 5 CP 85–1211§	9.82	P	U	L	R	U

*Continued*

**Table 1. Parentage, fiber content, and ratings of susceptibility to smut, rust, leaf scald, and mosaic for CP 70–1133 and 46 new sugarcane clones and ratings for freeze tolerance for CP 70–1133 and 22 new sugarcane clones (Continued)**

Clone	Parentage	Percent fiber	Cold Tolerancet	Rating*			
				Smut	Rust	Leaf scald	Mosaic
CP 92–1435††	CP 70–1133 × CP 72–2086	11.28	P	R	L	L	U
CP 92–1561	CP 82–2043 × CP 70–1133	10.50	P	R	L	R	L
CP 92–1607	CL 61–620 × CP 82–2043	8.65	G	R	L	L	U
CP 92–1640	CP 80–1827 × CP 84–1322	10.94	G	R	R	R	L
CP 92–1641††	CP 80–1827 × CP 84–1322	10.05	F	R	L	L	U
CP 92–1647	CP 80–1827 × CP 84–1322	10.02	G	L	L	L	S
CP 92–1666††	CP 82–1592 × CP 84–1322	10.28	P	U	L	R	L
CP 92–1684	CP 84–1714 × CP 80–1827	10.22	P	R	U	R	U
CP 93–1017	CP 84–1591 × CP 86–1206	11.12	P	R	S	R	R
CP 93–1065††	CP 78–1610 × CP 89–2178	9.99	G	R	R	R	R
CP 93–1309††	CP 81–1238 × CP 72–2086	9.14	G	R	U	R	U
CP 93–1361	90 P 19 CP 84–1591§	10.59	P	S	R	R	R
CP 93–1382††	CP 82–2043 × CL 73–239	10.12	G	R	R	R	R
CP 93–1544	CP 89–2372 × LCP 82–89	11.20	P	R	U	U	U
CP 93–1548	CP 89–2372 × LCP 82–89	10.92	F	R	R	U	U
CP 93–1555	CP 89–2372 × LCP 82–89	10.31	P	R	R	U	U
CP 93–1596	91 P 13 CP 84–1714§	9.09	F	R	R	U	U
CP 93–1634††	CP 83–1969 × CP 71–1240	9.58	G	R	R	U	R
CP 93–1688	CP 82–1172 × CP 86–1633	10.81	P	R	R	R	U

\*R = resistant enough for commercial production; L = low levels of disease susceptibility; S = too susceptible for production; U = undetermined susceptibility (available data not sufficient to determine the level of susceptibility).

†P = poor freeze tolerance; F = fair freeze tolerance; and G = good freeze tolerance.

‡Released for commercial production in Florida.

§67 P 6 = 6th polycross made in 1967 crossing season. Female parent (CP 56–63) exposed to pollen from many clones; therefore, male parent of CP 70–1133 unknown. Similar explanations for CP 90–1113, CP 90–1151, CP 90–1222, CP 90–1535, CP 91–1062, CP 91–1150, CP 91–1238, CP 91–1865, CP 91–1914, CP 92–1320, CP 93–1361, and CP 93–1596.

††Seed cane currently being increased by Florida Sugar Cane League for potential release.

**Table 2. Yields of cane (in metric tons per ha—TC/H) from plant cane on Pahokee muck and Lauderhill muck**

Clone	Mean yield by soil type, farm, and sampling date					Stability- safety index*	Mean yield, all farms
	Pahokee muck	Lauderhill muck					
	Duda 10/28/97	SFCW 1/6/98	Knight 1/27/98	Okeelanta 2/6/98	Wedgworth 2/16/98		
CP 93–1596	236.41	262.18	167.74	191.89	188.81	–20.53	209.41
CP 93–1634	224.59	238.71	168.72	141.09	179.90	–23.08	190.60
CP 70–1133	243.58	232.80	107.57	162.44	200.27	–143.81	189.33
CP 93–1382	194.17	218.40	162.40	138.26	187.96	–48.67	180.24
CP 93–1065	224.74	187.76	156.56	131.87	152.17	–40.45	170.62
CP 93–1548	206.22	202.56	163.16	133.97	143.99	–24.65	169.98
CP 93–1309	216.86	202.16	159.23	146.57	122.61	–52.40	169.49
CP 93–1544	189.79	176.70	210.70	124.12	105.92	–173.91	161.45
CP 93–1555	185.99	179.08	158.25	139.95	142.18	–43.76	161.09
CP 93–1688	190.21	180.02	128.99	133.69	152.78	–46.88	157.14
CP 93–1017	167.96	174.91	138.89	124.88	139.04	–52.34	149.14
CP 93–1361	176.63	170.30	139.76	125.88	110.88	–60.28	144.69
Meant†	204.76	202.13	155.16	141.22	152.21	–60.90	171.10
LSD ( <i>p</i> =0.1)	24.77	23.50	21.25	22.60	16.93		22.09
CV (%)‡	14.53	13.97	16.45	19.23	13.37		15.43

\*Stability-safety index for each clone is calculated at  $p=0.01$  by Eskridge's method and use of Shukla's stability-variance parameter. To compare two negative indices, the index with the lower absolute value is the greater of the two.

†LSD for location means = 10.86 TC/H at  $p=0.10$ .

‡CV = coefficient of variation.

**Table 3. Preharvest theoretical recoverable yields of 96° sugar (in kg per metric ton of cane—KS/T) from plant cane on Lauderdale muck**

Clone	Mean yield by soil type, farm, and sampling date				Stability- safety index*	Mean yield, all farms
	Lauderhill muck					
	Wedgworth 10/27/97	Knight 10/28/97	SFCW 10/28/97	Okeelanta 10/30/97		
CP 93-1309	103.6	120.8	104.6	102.0	53.5	107.7
CP 93-1548	104.0	105.2	108.4	113.4	67.7	107.7
CP 93-1688	100.3	105.7	100.3	114.4	60.5	105.2
CP 70-1133	83.9	109.0	104.7	113.9	65.5	102.8
CP 93-1634	81.5	92.5	113.5	100.1	59.8	96.9
CP 93-1017	85.9	103.3	99.9	95.0	59.4	96.0
CP 93-1544	83.0	84.2	108.9	99.7	53.4	93.9
CP 93-1555	63.5	88.8	110.1	98.1	42.4	90.1
CP 93-1065	70.6	93.3	106.2	81.9	42.9	88.0
CP 93-1382	64.7	81.0	94.8	107.5	37.9	87.0
CP 93-1361	64.7	86.2	93.1	92.9	51.5	84.2
CP 93-1596	69.2	85.4	90.6	86.2	52.8	82.8
Meant†	81.2	96.3	102.9	100.4	54.0	95.2
LSD (p=0.1)	17.3	14.1	14.9	18.4	10.2	
CV (%)‡	12.8	8.8	8.7	11.0	10.3	

\*Stability-safety index for each clone is calculated at  $p=0.01$  by Eskridge's method and use of Shukla's stability-variance parameter.

†LSD for location means = 5.8 KS/T at  $p=0.10$ .

‡CV = coefficient of variation.

**Table 4. Theoretical recoverable yields of 96° sugar (in kg per metric ton of cane—KS/T) from plant cane on Pahokee muck and Lauderhill muck**

Clone	Mean yield by soil type, farm, and sampling date					Stability- safety index*	Mean yield all farms
	Pahokee muck	Lauderhill muck					
	Duda 10/28/97	SFCW 1/6/98	Knight 1/27/98	Okeelanta 2/6/98	Wedgworth 2/16/98		
CP 93-1309	110.7	129.5	121.7	114.5	118.5	74.1	119.0
CP 93-1382	86.2	116.2	120.1	97.2	113.3	21.2	106.6
CP 93-1548	99.5	118.4	101.1	104.7	100.4	53.7	104.8
CP 70-1133	95.9	109.7	112.3	103.6	99.6	51.7	104.2
CP 93-1555	96.7	111.0	104.3	108.5	98.8	52.7	103.9
CP 93-1065	90.7	115.6	102.2	103.1	106.7	52.6	103.7
CP 93-1544	101.8	116.1	95.1	105.0	96.3	37.2	102.8
CP 93-1634	92.5	116.3	104.2	99.1	101.8	56.8	102.8
CP 93-1688	98.3	112.1	101.7	103.1	98.5	54.9	102.7
CP 93-1017	94.7	110.3	98.1	95.5	96.3	51.3	99.0
CP 93-1596	85.4	104.3	104.1	101.8	94.2	44.2	97.9
CP 93-1361	87.4	106.6	99.4	90.6	94.2	49.9	95.6
Meant	95.0	113.8	105.4	102.2	101.5	50.0	103.6
LSD (p=0.1)	8.0	5.7	5.1	6.8	5.0		5.2
CV (%)‡	10.1	6.0	5.9	8.0	5.9		7.2

\*Stability-safety index for each clone is calculated at  $p=0.01$  by Eskridge's method and use of Shukla's stability-variance parameter.

†LSD for location means = 2.8 KS/T at  $p=0.10$ .

‡CV = coefficient of variation.

**Table 5. Theoretical recoverable yields of 96° sugar (in metric tons per ha—TS/H) from plant cane on Pahokee muck and Lauderhill muck**

Clone	Mean yield by soil type, farm, and sampling date					Stability- safety index*	Mean yield, all farms
	Pahokee muck	Lauderhill muck					
	Duda 10/28/97	SFCW 1/6/98	Knight 1/27/98	Okeelanta 2/6/98	Wedgworth 2/16/98		
CP 93-1596	20.290	27.372	17.520	19.663	17.792	-5.513	20.527
CP 93-1309	24.113	26.219	19.303	16.871	14.482	-6.528	20.198
CP 93-1634	20.813	27.792	17.544	13.960	18.311	-6.640	19.684
CP 70-1133	23.644	25.621	12.149	16.819	19.999	-13.799	19.646
CP 93-1382	16.658	25.298	19.437	13.453	21.363	-14.082	19.242
CP 93-1548	20.396	24.049	16.462	14.007	14.466	-5.091	17.876
CP 93-1065	20.374	21.785	15.895	13.606	16.266	-5.532	17.585
CP 93-1555	18.107	19.784	16.493	15.162	14.045	-8.008	16.718
CP 93-1544	19.321	20.529	19.928	13.018	10.219	-15.720	16.603
CP 93-1688	18.841	20.218	13.127	13.896	15.076	-7.812	16.231
CP 93-1017	15.920	19.262	13.438	12.127	13.346	-7.844	14.818
CP 93-1361	15.616	18.156	13.821	11.416	10.450	-9.597	13.892
Meant†	19.508	23.007	16.260	14.500	15.484	-8.847	17.752
LSD (p=0.1)	3.110	3.018	2.126	2.517	2.030		2.371
CV (%)‡	19.157	15.760	15.711	20.859	15.756		17.588

\*Stability-safety index for each clone is calculated at  $p=0.01$  by Eskridge's method and use of Shukla's stability-variance parameter. To compare two negative indices, the index with the lower absolute value is the greater of the two.

†LSD for location means = 1.323 TS/H at  $p=0.10$ .

‡CV = coefficient of variation.

**Table 6. Preharvest and harvest yields of theoretical recoverable 96° sugar (in kg per metric ton of cane—KS/T) from plant cane on Pahokee muck, Torry muck, and Malabar sand**

Clone	Preharvest yield by soil type, farm, and sampling date				Harvest yield by soil type, farm, and sampling date			
	Pahokee muck	Torry muck	Malabar sand	Mean yield, all farms	Pahokee muck	Torry muck	Malabar sand	Mean yield, all farms
	Okeelanta 10/30/97	Eastgate 10/10/97	Hilliard 10/30/97		Okeelanta 2/12/98	Eastgate 2/25/98	Hilliard 11/25/97	
CP 92-1641	118.3	75.2	91.4	95.0	127.7	119.1	131.0	125.9
CP 92-1320	109.8	84.1	74.2	89.3	122.6	111.8	126.9	120.4
CP 92-1435	109.7	76.0	126.8	104.1	123.3	110.9	126.6	120.3
CP 92-1647	121.3	72.8	132.1	108.7	124.3	102.2	131.6	119.3
CP 92-1561	84.5	91.8	126.5	100.9	123.2	112.1	121.5	118.9
CP 92-1213	105.4	93.4	141.7	113.5	118.7	108.4	127.8	118.3
CP 92-1640	108.7	75.9	102.0	95.5	118.9	99.4	129.5	115.9
CP 92-1666	97.6	86.2	130.1	104.6	116.5	111.4	119.6	115.9
CP 70-1133	99.8	77.2	133.3	103.4	115.8	110.2	120.3	115.4
CP 92-1684	108.4	85.2	61.8	85.1	118.4	104.7	122.7	115.3
CP 92-1167	99.6	85.8	119.2	101.5	114.8	105.8	119.5	113.4
CP 92-1607	88.5	84.2	124.7	99.1	116.2	97.7	118.1	110.6
Mean*	104.3	82.3	113.6	100.1	120.0	107.8	124.6	117.5
LSD ( $p=0.1$ )	29.3	13.4	46.1	26.0	4.7	5.7	9.4	5.3
CV (%)†	16.9	7.4	25.1	19.5	4.7	6.3	9.0	7.0

\*LSD for location means at  $p=0.10$  are 26.4 KS/T for the preharvest yields and 2.1 KS/T for the harvest yields.

†CV = coefficient of variation.

**Table 7. Yields of cane and of theoretical recoverable 96° sugar (in metric tons per ha—TC/H and TS/H) from plant cane on Pahokee muck, Torry muck, and Malabar sand**

Clone	Cane yield by soil type, farm, and sampling date				Sugar yield by soil type, farm, and sampling date			
	Pahokee muck	Torry muck	Malabar sand	Mean yield, all farms	Pahokee muck	Torry muck	Malabar sand	Mean yield, all farms
	Okeelanta 2/12/98	Eastgate 2/25/98	Hilliard 11/25/97		Okeelanta 2/12/98	Eastgate 2/25/98	Hilliard 11/25/97	
CP 92-1666	112.69	300.84	116.88	176.81	13.097	33.713	14.087	20.299
CP 92-1167	128.60	240.47	138.06	169.04	14.791	25.406	16.426	18.874
CP 92-1435	117.49	229.16	105.11	150.59	14.524	25.485	13.284	17.764
CP 92-1641	110.58	195.34	117.91	141.28	14.091	23.339	15.376	17.602
CP 70-1133	122.83	225.62	108.87	152.44	14.234	24.896	13.027	17.386
CP 92-1607	114.79	213.89	122.11	150.26	13.356	20.942	14.584	16.294
CP 92-1213	140.53	192.35	83.22	138.70	16.878	20.888	10.702	16.156
CP 92-1320	102.20	230.10	82.19	138.16	12.549	25.703	10.215	16.156
CP 92-1684	107.46	189.31	126.69	141.15	12.758	19.849	15.551	16.053
CP 92-1647	95.56	215.19	96.07	135.61	11.883	22.223	12.615	15.574
CP 92-1561	93.50	193.14	112.54	133.06	11.469	21.587	13.642	15.566
CP 92-1640	109.64	180.83	112.55	134.34	13.029	18.018	14.610	15.219
Mean*	112.99	217.19	110.18	146.79	13.555	23.504	13.677	16.912
LSD ( $p=0.1$ )	17.94	34.59	24.60	29.45	2.275	4.295	3.064	3.733
CV (%)†	19.07	19.14	26.93	21.80	20.169	21.955	27.016	23.566

\*LSD for location means at  $p = 0.10$  are 17.98 TC/H for cane yield and 2.256 TS/H for sugar yield.

†CV = coefficient of variation.

**Table 8. Yields of cane (in metric tons per ha—TC/H) from first-ratoon cane on Dania muck, Lauderhill muck, Pahokee muck, and Pompano fine sand**

Mean yield by soil type, farm, and sampling date									
Clone	Dania muck		Lauderhill muck			Pahokee muck	Pompano fine sand	Stability-safety index*	Mean yield, all farms
	Knight 12/10/97	Okee-lanta 12/31/97	SFCW 12/8/97	Duda 1/22/98	Wedg-worth 2/6/98	SFCE 1/16/97	Lykes Bros. 11/27/96		
CP 92-1666	179.89	166.80	209.79	195.51	164.50	183.84	119.41	-7.69	174.25
CP 92-1167	171.34	176.24	216.31	178.28	181.99	165.94	121.11	-30.10	173.03
CP 92-1435	160.50	174.43	201.40	173.70	174.62	185.93	103.44	-33.61	167.72
CP 92-1684	167.42	158.61	178.79	196.91	121.50	179.79	88.41	-54.01	155.92
CP 70-1133	143.18	165.87	196.58	155.27	137.76	175.82	96.58	-46.07	153.01
CP 92-1561	161.88	135.15	190.73	183.32	114.53	145.94	106.80	-57.91	148.33
CP 92-1213	152.49	161.30	173.37	167.80	151.48	153.30	69.98	-55.53	147.10
CP 92-1640	163.29	151.10	178.17	171.15	111.31	148.83	103.84	-47.77	146.81
CP 92-1607	128.40	157.36	181.16	174.14	134.32	136.22	99.26	-50.19	144.41
CP 92-1641	135.83	152.77	158.85	157.28	126.85	145.75	103.86	-49.73	140.17
CP 92-1320	145.05	131.58	167.26	165.65	130.27	137.02	83.76	-47.01	137.23
CP 92-1647	108.09	122.68	132.52	136.32	70.74	121.31	75.51	-92.81	109.60
Meant†	151.45	154.49	182.08	171.28	134.99	156.64	97.66	-47.70	149.80
LSD ( $p=0.1$ )	19.81	13.74	11.90	22.47	16.92	18.28	20.12		11.45
CV (%)‡	15.72	10.68	13.14	15.77	15.06	14.03	24.76		14.91

\*Stability-safety index for each clone is calculated at  $p=0.01$  by Eskridge's method and use of Shukla's stability-variance parameter. To compare two negative indices, the index with the lower absolute value is the greater of the two.

†LSD for location means = 9.29 TC/H at  $p=0.10$ .

‡CV = coefficient of variation.

**Table 9. Theoretical recoverable yields of 96° sugar (in kg per metric ton of cane—KS/T) from first-ratoon cane on Dania muck, Lauderdale muck, Pahokee muck, and Pompano fine sand**

Clone	Mean yield by soil type, farm, and sampling date								Mean yield, all farms
	Dania muck		Lauderhill muck			Pahokee muck	Pompano fine sand	Stability- safety index*	
	Knight	Okee- lanta	SFCW	Duda	Wedg- worth	SFCE	Lykes		
	12/10/97	12/31/97	12/8/97	1/22/98	2/6/98	1/16/97	11/27/96		
CP 92-1641	106.3	131.5	118.4	114.5	130.8	125.1	122.2	70.1	121.2
CP 92-1647	108.4	123.8	106.9	121.2	117.5	118.6	123.1	74.6	117.1
CP 92-1607	106.9	130.3	114.5	107.0	118.3	120.1	120.3	70.9	116.8
CP 70-1133	113.9	124.3	113.1	113.6	111.6	112.4	119.7	74.4	115.5
CP 92-1561	107.6	121.0	112.9	107.8	114.2	112.7	123.2	76.4	114.2
CP 92-1213	110.1	124.4	96.4	117.6	116.4	118.5	115.9	55.6	114.2
CP 92-1320	100.5	121.6	113.7	113.1	113.4	108.7	117.0	73.1	112.6
CP 92-1435	98.0	116.1	110.5	112.1	113.5	113.7	110.9	66.7	110.7
CP 92-1666	101.7	115.4	102.8	107.9	113.9	110.4	118.4	73.9	110.1
CP 92-1640	103.9	118.0	107.4	108.6	106.5	97.9	119.4	60.2	108.8
CP 92-1167	105.0	107.4	95.4	106.0	115.7	115.4	108.0	47.3	107.5
CP 92-1684	103.5	118.5	114.1	101.9	110.5	83.1	119.8	22.3	107.3
Meant†	105.5	121.0	108.8	110.9	115.2	111.4	118.2	63.8	113.0
LSD (p=0.1)	11.1	9.6	11.9	8.4	4.8	9.3	9.1		5.1
CV (%)‡	12.6	9.5	13.1	9.1	5.0	10.0	9.3		10.0

\*Stability-safety index for each clone is calculated at  $p=0.01$  by Eskridge's method and use of Shukla's stability-variance parameter.

†LSD for location means = 2.8 KS/T at  $p=0.10$ .

‡CV = coefficient of variation.

**Table 10. Theoretical recoverable yields of 96° sugar (in metric tons per ha—TS/H) from first-ratoon cane on Dania muck, Lauderdale muck, Pahokee muck, and Pompano fine sand**

Clone	Mean yield by soil type, farm, and sampling date							Stability- safety index*	Mean yield, all farms
	Dania muck		Lauderhill muck			Pahokee muck	Pompano fine sand		
	Knight 12/10/97	Okee- lanta 12/31/97	SFCW 12/8/97	Duda 1/22/98	Wedg- worth 2/6/98	SFCE 1/16/97	Lykes 11/27/96		
CP 92-1666	18.228	19.204	21.724	21.129	18.684	20.336	14.010	0.059	19.045
CP 92-1435	15.824	20.145	22.316	19.357	19.733	21.123	11.365	-3.635	18.552
CP 92-1167	17.989	18.636	20.600	18.861	20.861	19.212	13.072	-3.843	18.462
CP 70-1133	16.269	20.634	22.248	17.691	15.356	19.730	11.644	-3.092	17.653
CP 92-1641	14.454	20.045	18.815	18.041	16.591	18.233	12.631	-3.063	16.973
CP 92-1607	13.864	20.551	20.748	18.684	15.877	16.284	11.878	-3.488	16.841
CP 92-1561	17.311	16.345	21.625	19.591	13.048	16.421	13.070	-5.557	16.773
CP 92-1213	16.793	20.039	16.543	19.763	17.603	18.085	8.077	-7.493	16.700
CP 92-1684	17.295	18.747	20.356	20.109	13.420	14.827	10.529	-4.677	16.469
CP 92-1640	16.992	17.818	19.190	18.565	11.837	14.579	12.384	-6.092	15.909
CP 92-1320	14.530	15.954	19.070	18.651	14.766	14.857	9.747	-3.769	15.368
CP 92-1647	11.753	15.243	14.156	16.633	8.334	14.337	9.197	-9.476	12.807
Meant†	15.942	18.613	19.782	18.923	15.509	17.335	11.467	-4.510	16.796
LSD (p=0.1)	2.656	2.054	2.989	2.754	1.914	2.443	2.388		1.495
CV(%)‡	20.018	13.261	18.153	17.488	14.829	16.932	25.018		17.756

\*Stability-safety index for each clone is calculated at  $p=0.01$  by Eskridge's method and use of Shukla's stability-variance parameter. To compare two negative indices, the index with the lower absolute value is the greater of the two.

†LSD for location means = 1.065 TS/H at  $p=0.10$ .

‡CV = coefficient of variation.

**Table 11. Theoretical recoverable yields of 96° sugar (in kg per metric ton of cane—KS/T) from first-ratoon cane on Pahokee muck, Torry muck, and Malabar sand**

Clone	Mean yield by soil type, farm, and sampling date			Mean yield, all farms
	Pahokee muck	Torry muck	Malabar sand	
	Okeelanta 12/13/97	Eastgate 2/25/98	Hilliard 11/25/97	
CP 91-1924	132.3	124.8	127.8	128.3
CP 91-1150	129.0	119.5	132.6	127.0
CP 91-1914	114.7	120.2	132.9	122.6
CP 91-2246	110.0	115.8	141.4	122.4
CP 91-1980	113.2	120.1	133.7	122.3
CP 70-1133	116.6	113.5	134.1	121.4
CP 91-1238	112.2	115.9	135.6	121.2
CP 91-1062	113.9	116.1	130.7	120.2
CP 91-1865	111.2	113.7	131.2	118.7
CP 91-1880	115.5	115.2	125.1	118.6
CP 91-1560		109.1	121.3	115.2
CP 91-1883	90.4	122.5	129.3	114.1
Mean*	114.4	117.2	131.3	122.7
LSD ( $p=0.1$ )	19.3	5.3	8.2	8.6
CV (%)†	20.2	5.5	7.5	12.5

\*LSD for location means = 4.0 KS/T at  $p=0.10$ .

†CV = coefficient of variation.

**Table 12. Yields of cane and of theoretical recoverable 96° sugar (in metric tons per ha—TC/H and TS/H) from first-ratoon cane on Pahokee muck, Torry muck, and Malabar sand**

Clone	Cane yield by soil type, farm, and sampling date				Sugar yield by soil type, farm, and sampling date			
	Pahokee muck	Torry muck	Malabar sand	Mean yield, all farms	Pahokee muck	Torry muck	Malabar sand	Mean yield, all farms
	Okeelanta 12/13/97	Eastgate 2/25/98	Hilliard 11/25/97		Okeelanta 12/13/97	Eastgate 2/25/97	Hilliard 11/25/97	
CP 70-1133	130.51	172.17	115.00	139.23	15.268	19.888	15.470	16.875
CP 91-1560		179.79	80.47	130.13		19.597	9.754	14.675
CP 91-1150	114.62	128.68	89.23	110.84	14.853	15.490	11.899	14.081
CP 91-1924	137.50	109.41	76.00	107.64	18.255	13.491	9.700	13.815
CP 91-1238	85.41	185.37	73.71	114.83	9.329	21.423	10.006	13.586
CP 91-1883	101.44	193.14	56.98	117.19	9.267	23.852	7.355	13.491
CP 91-1980	100.89	155.55	75.88	110.77	11.280	18.687	10.074	13.347
CP 91-1914	127.00	128.73	70.58	108.77	14.825	15.511	9.403	13.247
CP 91-1865	118.72	145.92	63.41	109.35	13.531	16.603	8.430	12.855
CP 91-2246	103.76	129.94	75.90	103.20	11.720	14.991	10.703	12.471
CP 91-1062	106.65	129.17	61.60	99.14	12.086	14.993	8.064	11.714
CP 91-1880	110.99	135.40	51.71	99.36	12.829	15.579	6.610	11.672
Mean*	112.50	149.44	74.21	112.54	13.022	17.509	9.789	13.486
LSD ( $p=0.1$ )	14.12	24.50	13.59	27.24	2.874	3.172	1.810	3.604
CV (%)†	15.09	19.70	22.01	19.75	26.516	21.769	22.213	24.293

\*LSD for location means at  $p = 0.10$  are 12.91 TC/H for cane yield and 1.813 TS/H for sugar yield.

†CV = coefficient of variation.

**Table 13. Yields of cane (in metric tons per ha—TC/H) from second-ratoon cane on Dania muck, Lauderhill muck, Pahokee muck, and Pompano fine sand**

Clone	Mean yield by soil type, farm, and sampling date								Stability- safety index*	Mean yield, all farms
	Dania muck		Lauderhill muck			Pahokee muck	Pompano fine sand			
	Okee- lanta	Duda	SFCW	Knight	Wedg- worth	SFCE	Lykes			
	10/7/97	10/21/97	10/22/97	10/29/97	11/5/97	10/15/97	11/13/97			
CP 91-1560	121.90	102.90	108.71	150.30	135.95	128.77	86.91	-5.84	119.35	
CP 91-1924	117.78	121.76	114.62	133.26	129.19	118.18	76.51	-33.30	115.90	
CP 91-1914	158.71	95.48	121.15	122.37	102.50	116.68	80.07	-26.99	113.85	
CP 70-1133	126.52	93.70	119.62	119.15	140.72	109.17	77.47	-1.61	112.34	
CP 91-1865	134.03	102.90	105.81	116.55	106.94	104.96	80.43	-29.06	107.37	
CP 91-1880	115.45	116.54	103.35	98.17	109.60	104.83	77.01	-36.45	103.56	
CP 91-1980	131.60	89.16	100.86	103.61	97.65	91.48	90.59	-17.19	100.71	
CP 91-1150	113.28	60.78	112.93	84.42	119.25	97.33	85.93	-46.23	96.27	
CP 91-1062	97.52	63.31	102.35	130.20	83.90	93.85	92.38	-57.67	94.79	
CP 91-1883	114.85	61.82	90.66	113.04	104.60	92.73	79.39	-11.90	93.87	
CP 91-2246	111.98	52.81	102.74	110.11		105.02	72.51	-26.67	92.53	
CP 91-1238	95.24	72.09	82.34	112.20	81.29	99.89	81.33	-36.12	89.19	
CP 91-1609					155.18					
Meant†	119.90	86.10	105.43	116.11	113.90	105.24	81.71	-27.42	103.31	
LSD (p=0.1)	15.60	19.81	13.13	19.33	15.09	19.59	16.79		13.02	
CV (%)‡	15.63	27.64	14.96	20.01	15.92	22.37	24.69		19.88	

\*Stability-safety index for each clone is calculated at  $p=0.01$  by Eskridge's method and use of Shukla's stability-variance parameter. To compare two negative indices, the index with the lower absolute value is the greater of the two.

†LSD for location means = 9.47 TC/H at  $p=0.10$ .

‡CV = coefficient of variation.

**Table 14. Theoretical recoverable yields of 96° sugar (in kg per metric ton of cane—KS/T) from second-ratoon cane on Dania muck, Lauderdale muck, Pahokee muck, and Pompano fine sand**

Clone	Mean yield by soil type, farm, and sampling date							Stability- safety index*	Mean yield, all farms
	Dania muck		Lauderhill muck			Pahokee muck	Pompano fine sand		
	Okee- lanta	Duda	SFCW	Knight	Wedg- worth	SFCE	Lykes		
	10/7/97	10/21/97	10/22/97	10/29/97	11/5/97	10/15/97	11/13/97		
CP 91-1914	116.2	121.3	115.5	132.7	132.3	136.8	117.8	44.1	124.7
CP 91-2246	106.0	118.7	121.0	129.8		133.6	96.2	37.6	117.6
CP 91-1924	106.1	120.3	92.2	127.7	134.1	130.7	108.7	23.3	117.1
CP 91-1238	86.9	118.5	117.4	131.9	122.3	126.5	109.8	34.8	116.2
CP 91-1560	105.0	118.6	111.6	125.2	117.7	119.0	113.2	40.6	115.7
CP 91-1980	99.0	108.1	113.7	123.3	119.8	129.9	105.5	39.9	114.2
CP 91-1880	80.7	119.3	113.1	123.5	127.4	133.5	101.0	24.2	114.1
CP 91-1062	97.6	105.2	114.0	123.4	121.6	132.1	99.8	40.8	113.4
CP 70-1133	98.0	102.3	116.7	127.8	117.4	119.7	110.2	33.4	113.2
CP 91-1865	100.2	114.7	95.9	118.2	122.7	124.0	113.1	31.8	112.7
CP 91-1150	106.5	109.0	116.6	116.5	108.3	125.9	103.1	30.5	112.3
CP 91-1883	99.2	114.4	103.4	116.1	117.3	126.6	100.0	38.7	111.0
CP 91-1609					118.2				
Meant†	100.1	114.2	110.9	124.7	121.6	128.2	106.5	35.0	115.1
LSD (p=0.1)	17.5	10.1	17.5	10.0	7.5	11.4	16.1		6.0
CV (%)‡	21.0	10.6	19.0	9.7	7.4	10.7	18.2		14.0

\*Stability-safety index for each clone is calculated at  $p=0.01$  by Eskridge's method and use of Shukla's stability-variance parameter.

†LSD for location means = 4.7 KS/T at  $p=0.10$ .

‡CV = coefficient of variation.

**Table 15. Theoretical recoverable yields of 96° sugar (in metric tons per ha—TS/H) from second-ratoon cane on Dania muck, Lauderhill muck, Pahokee muck, and Pompano fine sand**

Clone	Mean yield by soil type, farm, and sampling date							Stability- safety index*	Mean yield, all farms
	Dania muck		Lauderhill muck			Pahokee muck	Pompano fine sand		
	Okee- lanta	Duda	SFCW	Knight	Wedg- worth	SFCE	Lykes		
	10/7/97	10/21/97	10/22/97	10/29/97	11/5/97	10/15/97	11/13/97		
CP 91-1914	18.573	11.671	13.969	16.251	13.599	15.833	9.377	-7.762	14.182
CP 91-1560	12.802	12.144	11.967	18.678	16.038	15.071	9.962	-2.075	13.809
CP 91-1924	12.244	14.602	10.626	17.134	17.381	15.301	8.347	-6.546	13.662
CP 70-1133	12.426	9.703	14.075	15.405	16.526	13.133	8.550	-3.097	12.831
CP 91-1865	13.510	11.752	10.141	13.837	13.176	13.050	9.109	-6.644	12.082
CP 91-1880	9.227	13.917	11.722	12.291	14.030	14.185	7.560	-9.231	11.847
CP 91-1980	13.149	9.644	11.419	12.877	11.690	11.873	9.481	-6.225	11.447
CP 91-2246	11.833	6.292	12.447	14.415		14.051	6.574	-6.671	10.935
CP 91-1062	9.491	6.604	11.637	16.159	10.165	12.487	9.303	-8.882	10.835
CP 91-1150	12.055	6.773	13.071	9.955	12.956	12.108	8.818	-9.055	10.819
CP 91-1238	8.289	8.622	9.736	14.710	10.026	12.808	8.933	-7.483	10.446
CP 91-1883	10.917	7.120	9.151	13.230	12.343	11.667	7.763	-4.461	10.313
CP 91-1609					18.236				
Meant	12.043	9.903	11.663	14.579	13.847	13.464	8.648	-6.511	12.021
LSD (p=0.1)	2.568	2.550	2.355	2.858	2.142	2.832	2.108		1.672
CV (%)‡	25.624	30.937	24.260	23.552	18.591	25.272	29.283		25.020

\*Stability-safety index for each clone is calculated at  $p=0.01$  by Eskridge's method and use of Shukla's stability-variance parameter. To compare two negative indices, the index with the lower absolute value is the greater of the two.

†LSD for location means = 1.282 TS/H at  $p=0.10$ .

‡CV = coefficient of variation.

**Table 16. Theoretical recoverable yields of 96° sugar (in kg per metric ton of cane—KS/T) from second-ratoon cane on Dania muck, Torry muck, and Malabar sand**

Clone	Mean yield by soil type, farm, and sampling date			Mean yield, all farms
	Dania muck	Torry muck	Malabar sand	
	Okeelanta 10/6/97	Eastgate 12/19/97	Hilliard 11/19/97	
CP 90-1535	113.0	126.3	122.9	120.7
CP 90-1113	113.0	122.4	123.9	119.7
CP 90-1436	107.5	122.8	127.0	119.1
CP 90-1464	115.3	125.0	115.1	118.5
CP 90-1424	113.4	121.2	115.2	116.6
CP 90-1151	110.5	121.3	117.6	116.5
CP 90-1510	107.2	119.5	115.9	114.2
CP 70-1133	112.3	114.9	111.8	113.0
CP 90-1222	105.8	112.1	111.5	109.8
CP 90-1549	105.8	112.4	108.7	109.0
CP 90-1204	105.7	114.3	106.0	108.7
CP 90-1428	103.2	101.1		102.1
CP 90-1030			112.2	
Mean*	109.4	117.8	115.6	114.3
LSD ( $p=0.1$ )	14.8	6.9	12.6	5.4
CV (%)†	16.3	7.1	14.9	12.8

\*LSD for location means = 4.1 KS/T at  $p=0.10$ .

†CV = coefficient of variation.

**Table 17. Yields of cane and of theoretical recoverable 96° sugar (in metric tons per ha—TC/H and TS/H) from second-ratoon cane on Dania muck, Torry muck, and Malabar sand**

Clone	Cane yield by soil type, farm, and sampling date				Sugar yield by soil type, farm, and sampling date			
	Dania muck	Torry muck	Malabar sand	Mean yield, all farms	Dania muck	Torry muck	Malabar sand	Mean yield, all farms
	Okeelanta 10/6/97	Eastgate 12/19/97	Hilliard 11/19/97		Okeelanta 10/6/97	Eastgate 12/19/97	Hilliard 11/19/97	
CP 90-1549	123.55	166.12	136.39	142.02	13.133	18.697	14.827	15.552
CP 90-1222	137.93	153.73	128.15	139.94	14.560	17.201	14.411	15.391
CP 90-1464	123.75	156.49	107.70	129.31	14.158	19.503	12.500	15.387
CP 90-1436	99.10	135.80	122.74	119.21	10.685	16.751	15.563	14.333
CP 70-1133	95.68	138.65	125.34	119.89	10.586	15.863	13.940	13.463
CP 90-1424	99.85	119.84	99.92	106.54	11.362	14.443	11.556	12.454
CP 90-1204	107.66	137.70	98.07	114.48	11.291	15.525	10.253	12.356
CP 90-1151	94.59	108.93	105.26	102.92	10.494	13.286	12.320	12.033
CP 90-1510	94.56	115.89	98.40	102.95	10.165	13.862	11.430	11.819
CP 90-1535	68.95	120.19	88.63	92.59	7.777	15.182	10.953	11.304
CP 90-1113	104.70	79.72	68.34	84.25	11.799	9.804	8.429	10.011
CP 90-1428	97.52	148.79		123.15	10.013	15.152		12.582
CP 90-1030			117.40			13.305		
Mean*	103.99	131.82	108.03	114.61	11.335	15.439	12.457	13.077
LSD ( $p=0.1$ )	11.29	18.71	12.57	17.96	1.855	2.415	2.427	2.206
CV (%)†	13.05	17.06	22.17	17.40	19.668	18.795	23.413	21.809

\*LSD for location means at  $p=0.10$  are 8.90 TC/H and for cane yield and 1.062 TS/H for sugar yield.

†CV = coefficient of variation.

**Table 18. Dates of stalk counts at 8 plant-cane, 10 first-ratoon, and 10 second-ratoon experiments**

Location	Crop		
	Plant cane	First ratoon	Second ratoon
Duda	7/1/97	7/29/97	8/23/97
Eastgate	7/15/97	9/5/97	9/8/97
Hilliard	7/16/97	9/12/97	9/11/97
Knight	7/14/97	7/24/97	8/4/97
Lykes	—	9/12/97	9/15/97
SFCW	6/25/97	8/7/97	8/8/97
Okeelanta	7/11/97	7/8/97	7/18/97
Okeelanta (successive)	7/17/97	8/20/97	8/26/97
SFCE	—	9/9/97	7/31/97
Wedgworth	6/30/97	7/23/97	8/12/97





